

## The 6Rs of Radiobiology in Photodynamic Therapy: Review

**Authors :** Kave Moloudi, Heidi Abrahamse, Blassan P. George

**Abstract :** Radiotherapy (RT) and photodynamic therapy (PDT) are both forms of cancer treatment that aim to kill cancer cells while minimizing damage to healthy tissue. The similarity between RT and PDT lies in their mechanism of action. Both treatments use energy to damage cancer cells. RT uses high-energy radiation to damage the DNA of cancer cells, while PDT uses light energy to activate a photosensitizing agent, which produces reactive oxygen species (ROS) that damage the cancer cells. Both treatments require careful planning and monitoring to ensure the correct dose is delivered to the tumor while minimizing damage to surrounding healthy tissue. They are also often used in combination with other treatments, such as surgery or chemotherapy, to improve overall outcomes. However, there are also significant differences between RT and PDT. For example, RT is a non-invasive treatment that can be delivered externally or internally, while PDT requires the injection of a photosensitizing agent and the use of a specialized light source to activate it. Additionally, the side effects and risks associated with each treatment can vary. In this review, we focus on generalizing the 6Rs of radiobiology in PDT, which can open a window for the clinical application of Radio-photodynamic therapy with minimum side effects. Furthermore, this review can open new insight to work on and design new radio-photosensitizer agents in Radio-photodynamic therapy.

**Keywords :** radiobiology, photodynamic therapy, radiotherapy, 6Rs in radiobiology, ROS, DNA damages, cellular and molecular mechanism, clinical application.

**Conference Title :** ICARP 2024 : International Conference on Advances in Radiation Physics

**Conference Location :** London, United Kingdom

**Conference Dates :** April 11-12, 2024